

NOVEMBER 29, 1940

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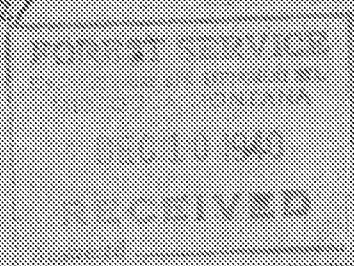
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PRIMARY WOOD-PRODUCTS INDUSTRIES

IN THE LOWER SOUTH

By

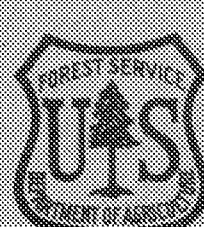
H. F. Smith
Specialist in Forest Industries



A Progress Report by

THE SOUTHERN FOREST SURVEY

I. F. Eldredge, Regional Survey Director



SOUTHERN FOREST EXPERIMENT STATION

E. L. Demmon, Director

New Orleans, La.

FOREWORD

The Nation-wide Forest Survey, being conducted by the United States Forest Service, was authorized by the McSweeney-McNary Forest Research Act of 1928. Its five-fold object is: (1) To make an inventory of the present supply of timber and other forest products; (2) to ascertain the rate at which this supply is being increased through growth; (3) to determine the rate at which this supply is being diminished through industrial and local use, windfall, fire, and disease; (4) to determine the present requirement and the probable future trend in the requirement for timber and other forest products; and (5) to correlate these findings with existing and anticipated economic conditions, in order that policies may be formulated for the effective use of land suitable for forest production. In the South, the Forest Survey functions as an activity of the Southern Forest Experiment Station with headquarters at New Orleans, La.

This release is based on studies made between 1934 and 1939 to determine the number, character, and location of forest industrial plants, and to ascertain the drain against the forest growing stock for both industrial and domestic purposes, including the use of wood for fuel and farm needs as mentioned under items 3 and 4 above. It should be regarded as a progress report only, since it contains Forest Survey data that will be included in complete reports to be published later; such data, although considered reliable, are subject to correction or amplification as the work of computation proceeds. A preliminary report was distributed in 1937 as Survey Release No. 25. The same basic information on sawmills, somewhat revised and brought up to date, is used in this report, with the addition of data on the nonlumber industries.

Information on equipment, logging, and employment was obtained by the Forest Survey in 1934 and 1935. The data on production, number, character, and location of industrial plants were collected in 1937 and 1938 and revised currently for some of the industries. All of the major nonlumber plants and the medium- and large-sized sawmills were visited by investigators carrying a questionnaire. Because of the great number of small sawmills, it was possible to examine only about 10 percent of them; for the remainder, information was obtained indirectly, but from sources considered reliable. The relative accuracy of the findings is greater for the large mills than for the small ones.

Assisting Staff

P. R. Wheeler, Forest Economist, In Charge of Mensurational Analyses

Note: Assistance in the preparation of these materials was furnished by the personnel of Work Projects Administration official project 65-2-64-74.

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
SOUTHERN FOREST EXPERIMENT STATION



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RE - SS
FOREST SURVEY
Reports
Forest Survey Release No. 51

November 29, 1940

Handwritten: SUBV. 11-11-40

Dear Sir:

In addition to making a field inventory of the timber resource and a calculation of the rate at which our forests are growing, the Forest Survey has also to determine the drain on this resource. Since the major part of the forest drain goes into lumber, poles and piles, veneer, cross ties, and pulpwood, it is necessary to make and keep up to date a study of the primary wood-using industries.

In the enclosed Survey Release No. 51, entitled "Primary wood-products industries in the lower South," by H. F. Smith, you will find a descriptive account of the several major primary wood-using industries of the region. The release briefly describes each industry separately and gives the number and character of all plants, together with a size classification of sawmills; a description of the logging methods employed by the lumber industry; a statement of the kinds of raw material utilized and the commodities produced; and some information on the labor required.

I hope that you will find this information of interest and perhaps of value in formulating a comprehensive picture of the forest resource situation in the lower South.

Very truly yours,

E. L. DEBON, Director.

By *I. F. Eldredge*
I. F. Eldredge,
Regional Survey Director.

Encl.

PRIMARY WOOD-PRODUCTS INDUSTRIES IN THE LOWER SOUTH

The region covered by the Forest Survey in the lower South embraces the commercially timbered areas of the Gulf States, Georgia, and parts of Arkansas, Oklahoma, Missouri, Tennessee, and Kentucky.^{1/} This region is divided into four subregions, the longleaf-slash pine, the delta-hardwoods, and two pine-hardwood areas, east and west. The longleaf-slash pine area, which is the seat of the naval stores industry, is characterized by forests of longleaf and slash pine, with a varying admixture of hardwoods, cypress, loblolly, and other pines. In the two pine-hardwood subregions the forests are chiefly loblolly and shortleaf pines with a considerable volume of intermixed hardwoods, although in parts of southeastern Texas and southwestern Louisiana longleaf pine is also important from a production standpoint. The forests of the Mississippi River bottoms are almost entirely hardwoods.

In figure 1 is shown an allocation by product of the total volume of wood cut from the sound-tree growing stock of the lower South, which in 1937 was 41,302,000 standard cords. The volume considered commercial, of course, is that which entered the direct channels of trade. The volume shown as noncommercial, no less important in its use value, was utilized chiefly by farmers and landowners, though small quantities of fuel wood and fence posts were sold locally.

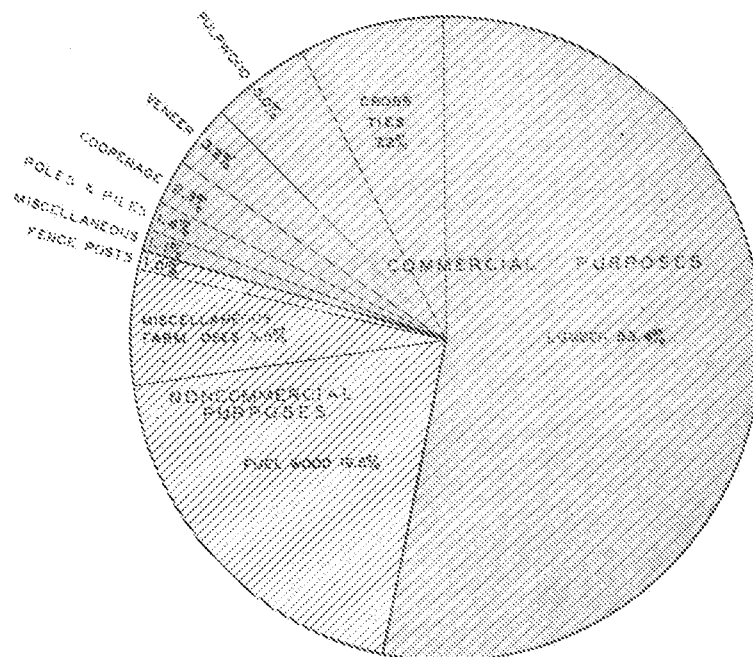


FIGURE 1. - PERCENTAGES OF TOTAL DRAIN FROM SOUND TREES FOR VARIOUS COMMODITY USES, 1937.

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^{1/} The data for the Delta portions of Missouri, Kentucky, and Tennessee have been combined with Arkansas Survey Unit No. 2 in the text and tables, but kept separate on the maps throughout the report.

Lumber ranks first among the commodity drains on the forest, causing 53 percent of the total depletion for all commodities. Present indications are that the manufacture of lumber will continue to be the major forest industry, notwithstanding the steady expansion in the manufacture of other forest products such as pulp and paper, cellulose, and veneers.

The standing of the states or parts of states in each of six important industrial forest uses is shown in figure 2. For many commodities the relative standing of the states in the region is not the same for any length of time. In 1937, for instance, Alabama led in cubic-foot volume removed from the forest for the manufacture of lumber; the previous year (1936), Mississippi had the lead; and 5 years from now the leadership in this use may be in some state not now in the first three.

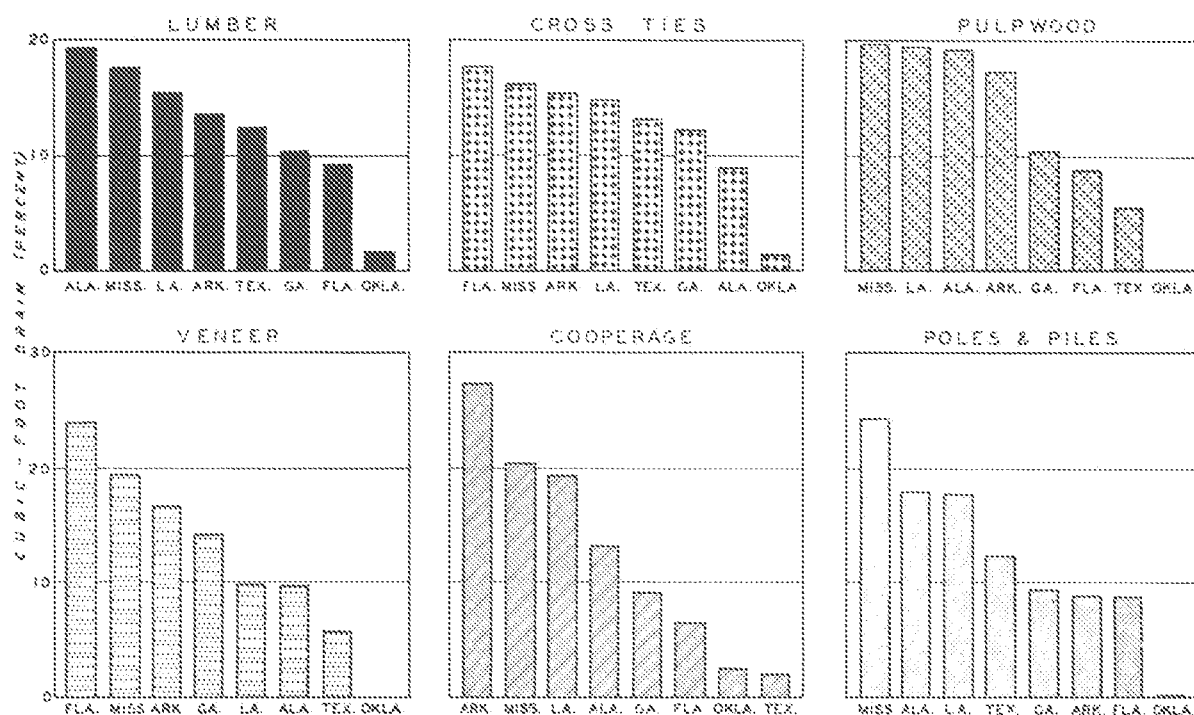


FIGURE 2.—RELATIVE STANDING OF THE STATES IN CHIEF ITEMS OF COMMERCIAL DRAIN, 1937.

PREPARED BY FOREST SURVEY, SOUTHERN FOREST EXPERIMENT STATION—RELEASE NO. 51.

The Lumber Industry

The production of lumber, as an industry of the South, began in the early days, but until about 1875 the forests were logged mainly for local consumption, except along the Atlantic Coast where an export trade had long existed. A commercial expansion gradually developed, which received added impetus in the late eighties, when the progressive exhaustion of northern timber supplies turned the larger mills southward. For the next 40 years great areas of virgin forest, particularly longleaf pine, throughout the South were bought up in extensive consolidated tracts and subjected to rapid, large-scale mechanized exploitation. Similar liquidation of the hardwood and shortleaf pine forests of the lower South did not begin so early and has not progressed so rapidly.

As the larger pine operators, particularly those who had logged their holdings less intensively, relinquished certain areas, small mills began to appear; as the residual stands were bolstered up with second growth, the number and production of these plants increased. In the bottomland hardwood districts, the large mills are succeeded not so often by small sawmills as by plants manufacturing slack staves, handle stock, cross ties, and other nonlumber commodities.

Classes of sawmills

In 1937 there were in the entire area more than 8,000 sawmills of all sizes, both portable and stationary. They ranged in size from the smallest, producing a few thousand board feet per annum for local use, to the largest, cutting as much as 80 million board feet a year. The total number of sawmills is listed in table 1 by states, further classified according to size and, for the mills with a daily capacity of 20 M board feet and over, by principal species cut. The map (fig. 3) shows the approximate location of the mills.

The three species groups into which mills are classified are pine, hardwood, and cypress. All mills cutting more than 50 percent of their volume from pine species in 1937 are classified as pine mills. Hardwood mills, the second group, are those that cut more than 50 percent of their total production from hardwood species. Similarly, to be classified as a cypress mill, a mill must cut more than 50 percent of its production in cypress lumber. In many cases, a mill manufacturing pine, hardwood, or cypress at the time of the survey may have changed later to some other species.

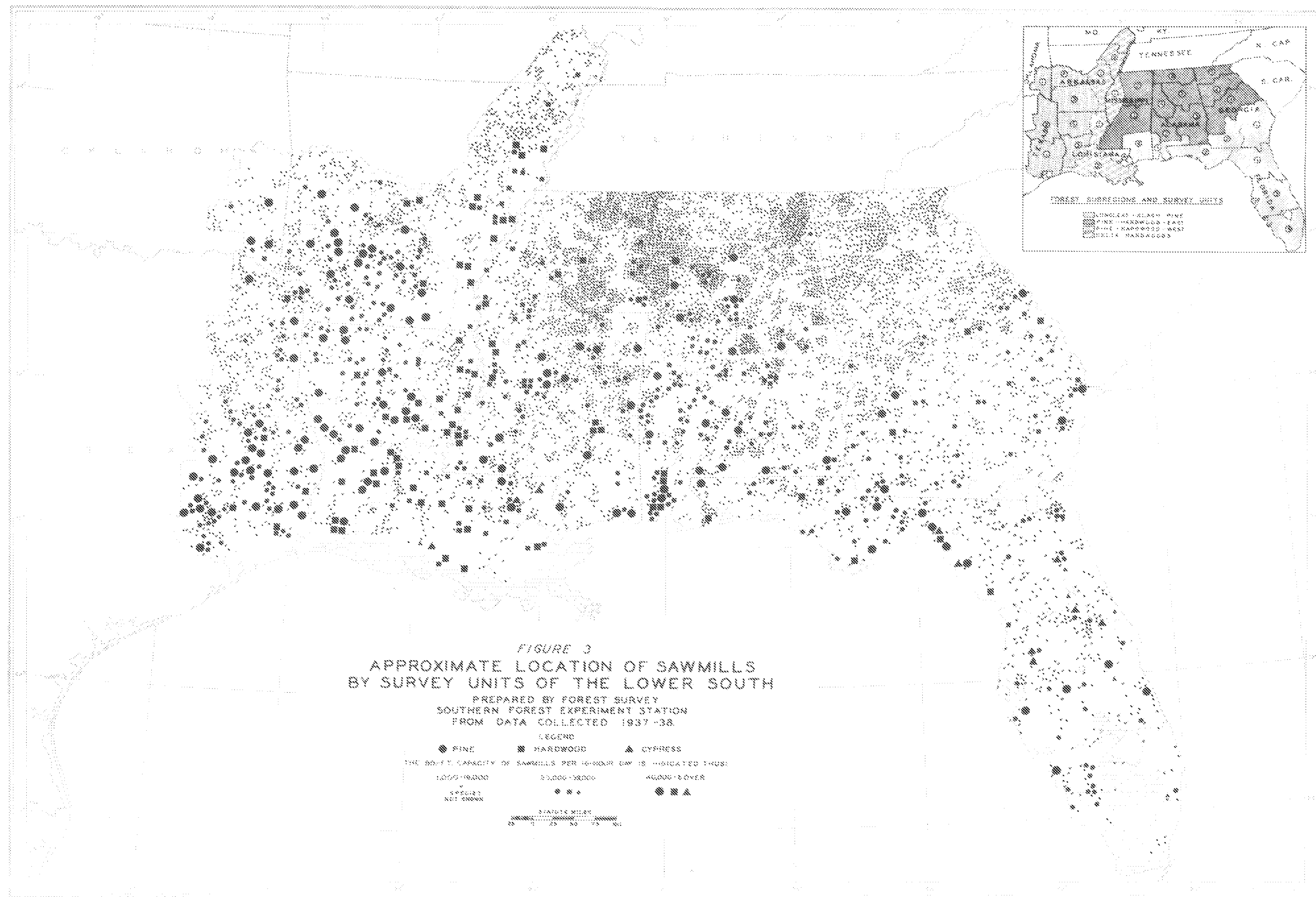
All mills listed as having a daily capacity of 40 M board feet or more are stationary mills, operating generally throughout the year. In the Delta region, hardwood mills of 20 to 39 M board feet capacity are usually stationary also. Many of the pine mills of this size remain on one site for a long time, but others are occasionally moved to new blocks of timber. Most mills of a daily capacity of 19 M board feet and less are easily moved and shift

2/ It will be noted that table 1 shows the number of sawmills in the region in 1937, the latest year for which data on all plants were complete. The map (fig. 3) showing the location of plants was revised to the latest year for which data were available; in the states west of the Alabama-Mississippi line, the locations are as of 1938; in the eastern states the locations are as of 1937.

Table 1.--Number of sawmills in the lower South, 1937

Survey unit	Species group and size class of mill (10-hour M feet b.m. capacity)													
	Pine			Hardwood			Cypress			All mills				
	80+	40-79	20-39	80+	40-79	20-39	80+	40-79	20-39	80+	40-79	20-39	1-19	Total
Alabama #1	1	5	13	-	4	3	-	-	-	1	9	16	83	109
" #2	1	2	25	-	-	4	-	-	-	1	2	29	130	162
" #3	1	2	9	-	-	13	-	-	-	1	2	22	396	421
" #4	1	2	10	-	-	2	-	-	-	1	2	12	341	356
" #5	-	3	14	-	-	1	-	-	-	-	3	15	636	654
" #6	-	-	-	-	-	-	-	-	-	-	-	-	508	508
Total Alabama	4	14	71	-	4	23	-	-	-	4	18	94	2,094	2,210
Arkansas #1	-	-	-	1	7	5	-	-	-	1	7	5	130	143
" #2	-	-	-	2	2	7	-	-	-	2	2	7	234	245
" #3	6	7	35	1	-	4	-	-	-	9	7	39	250	265
" #4	2	-	5	-	1	-	-	-	-	2	1	5	163	171
Total Arkansas	10	7	40	4	10	16	-	-	-	14	17	56	777	864
Florida #1	3	-	7	1	1	1	3	-	6	7	1	14	152	175
" #2	2	6	18	1	3	1	-	-	-	3	8	19	176	206
" #3	2	2	10	-	-	1	-	4	5	2	6	14	152	174
" #4	-	1	10	-	-	-	-	-	1	-	1	11	39	51
Total Florida	7	9	45	2	4	3	3	4	10	12	16	58	520	606
Georgia #1	-	2	10	-	-	7	-	-	-	-	2	17	222	241
" #2	-	1	13	-	-	2	-	-	-	-	1	12	102	115
" #3	-	3	9	-	3	2	-	-	-	-	6	11	512	533
" #4	-	-	-	-	-	-	-	-	-	-	-	-	369	369
" #5	-	-	-	-	-	-	-	-	-	-	-	-	345	345
Total Georgia	-	6	32	-	3	11	-	-	-	-	9	43	1,555	1,607
Louisiana #1	-	-	1	2	7	4	-	-	-	2	7	5	89	103
" #2	-	-	4	-	11	10	-	1	2	-	12	16	123	151
" #3	9	5	5	3	6	-	-	-	-	12	11	3	69	95
" #4	2	1	4	1	-	1	1	-	-	4	1	5	52	69
" #5	1	6	22	-	2	4	-	-	-	1	8	25	104	129
Total Louisiana	12	12	34	6	26	19	1	1	2	19	39	55	444	557
Mississippi #1	-	-	-	1	2	10	-	-	-	1	2	10	109	122
" #2	-	-	3	-	3	6	-	-	-	-	3	9	681	693
" #3	4	6	22	-	2	13	-	-	-	4	10	25	551	600
" #4	4	1	7	1	3	-	-	-	-	5	4	7	196	214
Total Mississippi	8	9	32	2	10	29	-	-	-	10	19	61	1,537	1,629
Oklahoma #1	2	-	2	-	-	1	-	-	-	2	-	3	59	75
Texas #1	12	10	21	2	2	5	-	-	-	14	12	36	146	208
" #2	2	2	22	-	1	2	-	-	-	2	3	54	301	330
Total Texas	14	12	53	2	3	7	-	-	-	16	15	60	447	538
Grand total	58	68	309	16	60	159	4	5	12	78	132	430	7,445	8,086

1/ Includes Delta portion of Missouri, Kentucky, and Tennessee; refer to map (fig. 3).



frequently from place to place as new timber supplies are purchased. A considerable number of this group, however, particularly some of the smallest mills, operate with the surplus power of cotton gins, grist mills, etc., strictly for local needs, and are therefore stationary.

Of the total number of mills (table 1), approximately 1 percent have a capacity of at least 80 M board feet per 10-hour day, 2 percent have a daily capacity of 40 to 79 M board feet, 5 percent are in the 20 to 39 M class, and 92 percent are small units with a capacity less than 20 M board feet. Of the large mills (40 M board feet and over), about 60 percent are classified as pine mills, 36 percent as hardwood, and 4 percent as cypress. In the medium-sized class (20 - 39 M board feet), 72 percent are pine, 25 percent are hardwood, and 3 percent are cypress.

The small mills (1 - 19 M board feet) are not subdivided on the basis of species classification in the 1937 tables; however, in the Delta region these mills generally cut hardwood, while in the uplands most of the mills cut pine. Small portable mills can be set up to cut several thousand to several million board feet of timber at a "set," and if logs are available, can be operated economically from a few weeks in a season to a full working year. Ordinarily this type of mill does not accumulate large inventories, but works on a "hand-to-mouth" basis. Such mills may cut any quality and size of timber, but usually operate in small second-growth stands.

Concentration yards

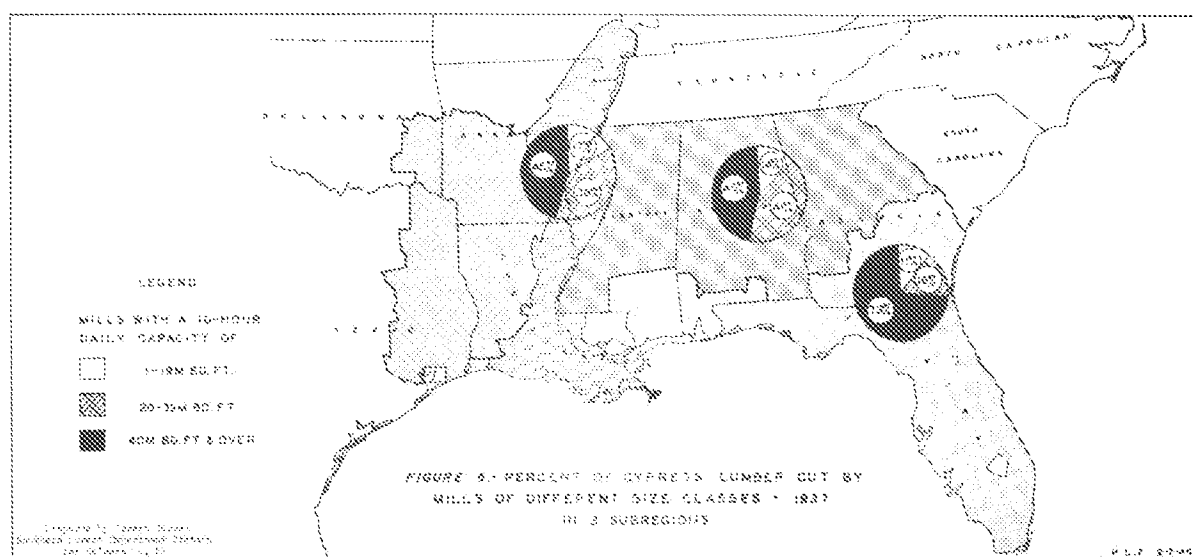
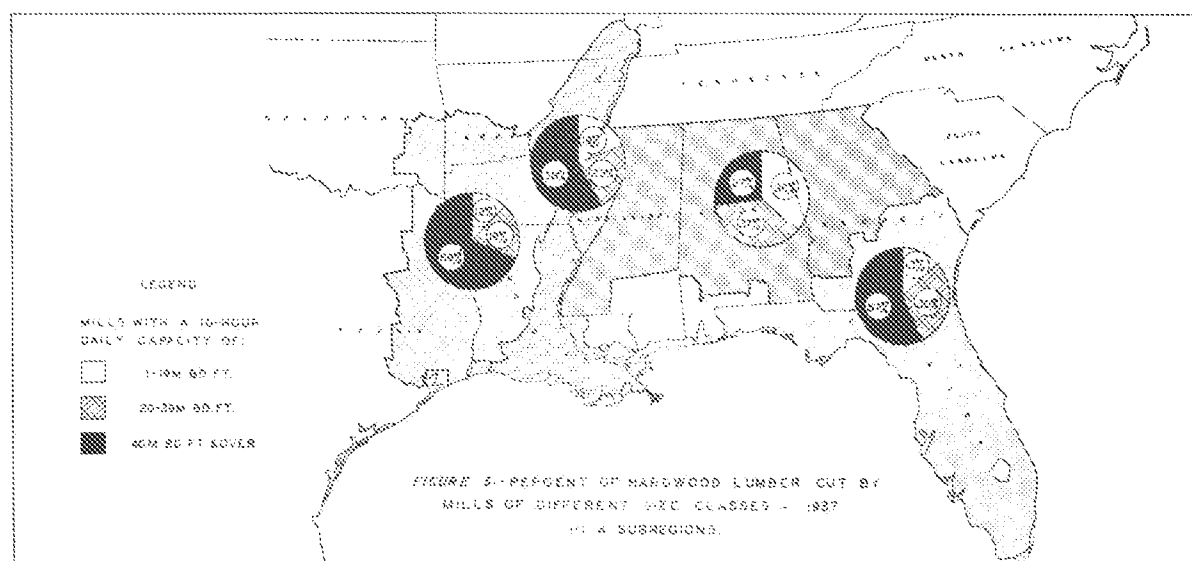
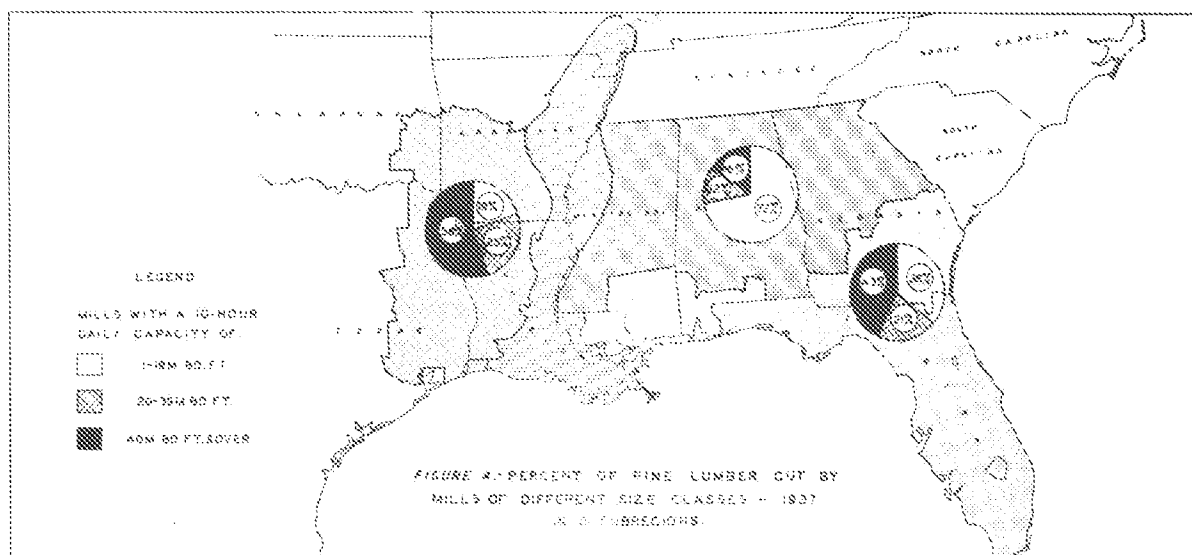
Throughout the pine regions, pine lumber sawed by groups of small mills is generally seasoned, surfaced, and graded either at nearby planing mills or at concentration yards. These yards are usually equipped with dry kilns, planers, and adequate grading, storage, and shipping facilities. From them a considerable proportion of the pine lumber finds its way to markets, both local and distant. In the lower South there are about 500 of these concentration yards, and more than 500 sawmills which act in this capacity. Most of them (over four-fifths) are located in the pine-hardwood subregion (east), the area with the greatest number of small mills. The remaining one-fifth are divided between the longleaf-slash pine area and the pine-hardwood area (west).

In the production of hardwood lumber, concentration yards do not play an important part, and rough air-dried lumber produced by small mills is usually shipped directly to one of the manufacturing plants throughout the country for final finishing and fabrication.

Lumber cut by mills of the various size classes

The growing share of the small sawmills in the total amount of lumber cut has been apparent for many years, particularly during the past two decades, when many of the large mills of the earlier period discontinued operations. The proportion of the 1937 lumber production cut by mills in the different size groups and in the different subregions is shown graphically in figure 4 for pine, figure 5 for hardwoods, and figure 6 for cypress.

The small mills, constituting 92 percent of all mills, accounted for 44 percent of the total production of pine lumber in 1937. In Alabama and



northwestern Louisiana, information procured from operators during the 1935 canvass indicated that about two-fifths of the small-mill pine production was cut by mills that moved at least once in three years. It is probable that this was characteristic of small-mill pine production throughout the lower South in 1935. Movement of mills at that time was at a low point, owing to the small volume of business. The proportion cut by migratory mills was undoubtedly much greater in 1937.

The large mills, which amounted to only 3 percent of the total number of mills, cut 37 percent of the pine lumber. The mills in the medium-sized class made up 5 percent of the total number of mills and accounted for the remaining 19 percent of the pine-lumber production. Although the large mills cut only a little more than a third of all pine lumber, the value of their production is considerably greater than a third of the total value of pine lumber produced, because the lumber manufactured in these mills is of higher quality and is graded and marketed to better advantage.

Of the hardwood cut in the region, approximately 51 percent is produced by large mills, 27 percent by the medium-sized mills, and 22 percent by small mills.

At present, the cypress mills are located chiefly in Florida and southern Louisiana. Of the cypress lumber produced in the territory covered by the survey 68 percent is cut by large mills, 20 percent by medium-sized, and 12 percent by small mills.

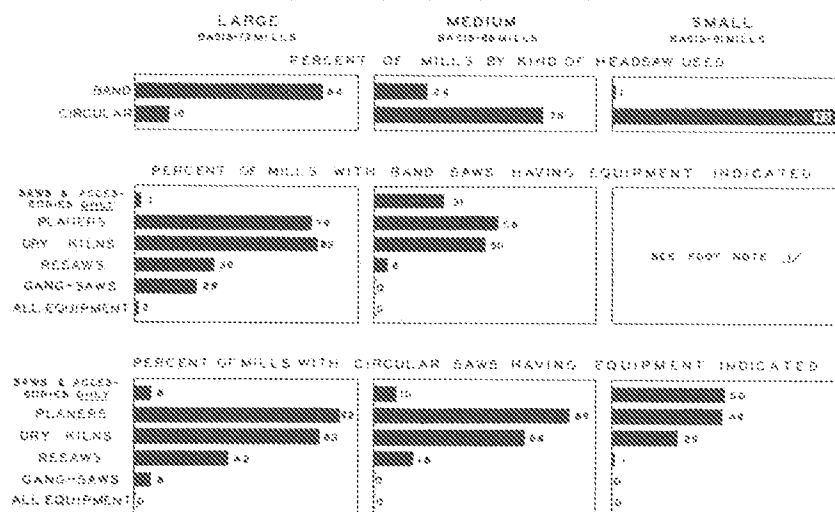
The number of small mills is steadily increasing, and their production, although it rises and falls with the demand for lumber, is also increasing in amount and in proportion of the total cut. Between 1935 and 1940, 45 large mills—including the largest mill in the South—with a total yearly production capacity of more than a billion board feet, ceased operation. Moreover, many mills in this and the medium-sized class reduced their capacity and now fall within a smaller class. A few of the mills in the two upper size groups switched from the production of one species group to another. A majority of the large mills that have ceased operation were set up on a forest depletion or liquidation basis, chiefly in the original long-leaf pine stands.

Sawmill equipment

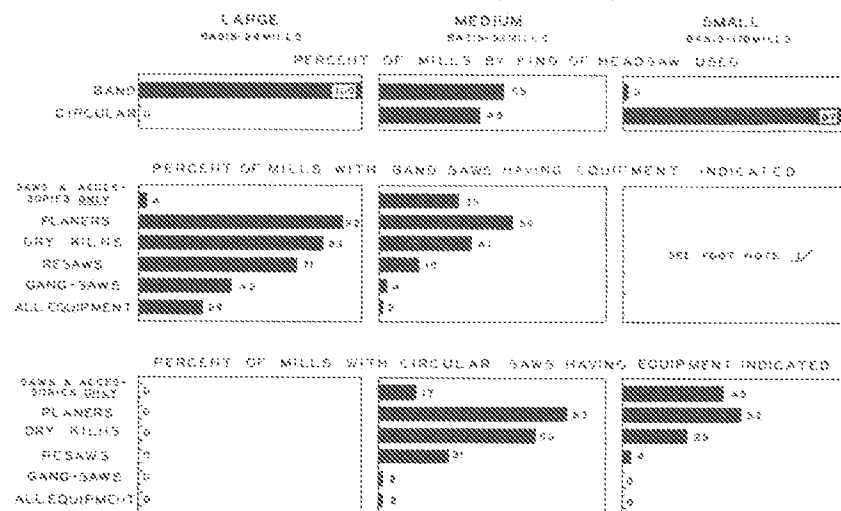
As to equipment, sawmills in the lower South vary from the completely equipped mill, containing headsaw, resaw, gang-saw, dry kiln, planer, and accessories such as edgers and trimmers, to the portable mill with a headsaw only.

In 1934-35, the Survey recorded the type of equipment used by 901 representative mills visited, to obtain a pattern of equipment used. The sample includes data for 178 large mills, 264 medium-sized mills, and 459 small mills distributed over the 4 forest subregions somewhat in proportion to the total number of mills in each. Figure 7 shows the equipment pattern found. Band saws were used by 88 percent of the large mills, 45 percent of the medium mills, and about 3 percent of the small mills. While most of the circular-saw mills were in the small-sized group, there were a few large mills still using circular headsaws, generally old mills whose original equipment had never been replaced.

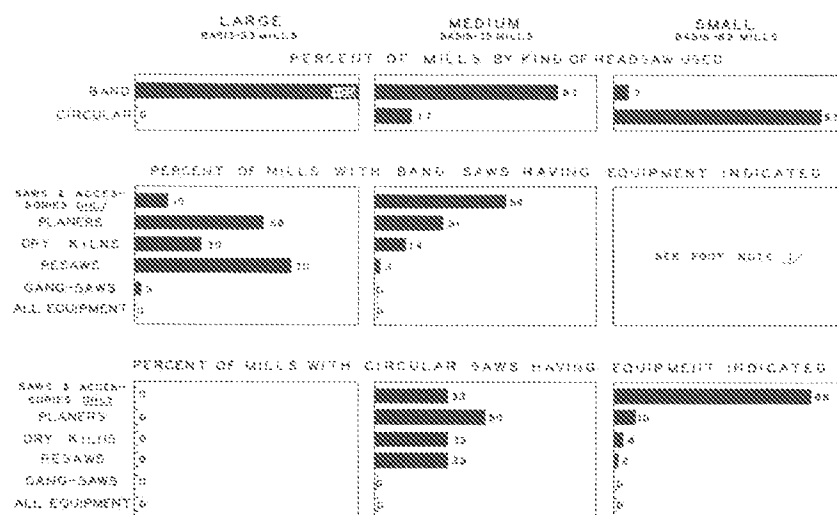
PINE-HARDWOOD SUBREGION - WEST



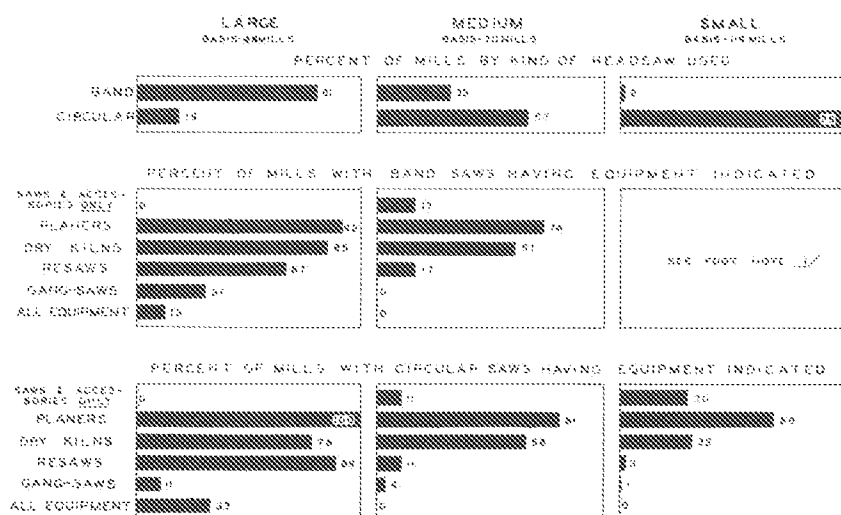
PINE-HARDWOOD SUBREGION - EAST



DELTA HARDWOOD SUBREGION



LONGLEAF-SLASH PINE SUBREGION



1/ THE SAMPLE IN THESE CLASSIFICATIONS WAS NOT CONSIDERED REPRESENTATIVE ENOUGH TO PERMIT CONCLUSIVE PRESENTATION OF DATA.

FIGURE 7.- SAWMILL-EQUIPMENT PATTERN.
(BASED ON SURVEY OF 1934-35)

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RELEASE NO. 51.

More than half of the small mills sampled had only headcaws, with or without accessories. A few of the large and one-fourth of the medium-sized mills were found to have similarly limited equipment. Dry kilns and planers were found in mills of all sizes, but less often, of course, in small mills, and rarely in portable mills. Resaws and gang-saws were found chiefly in the large mills. Less than one-tenth of the large mills had all four items. Few of the medium and none of the small mills were so equipped.

Transportation of logs

Moving logs to the place of manufacture generally includes two separate steps: The bunching or yarding in the woods or on the roadside, and the final transportation to the mill. In a large portion of the lower Coastal Plain, termed the "flatwoods," the logs are loaded directly on trucks and taken to the mill without any preliminary yarding. This practice is carried on chiefly by small mills. During the canvass in 1934-35 the Survey gathered information to obtain a general pattern of the logging practices of sawmills. This pattern is shown in figures 8 and 9 for the two operations.

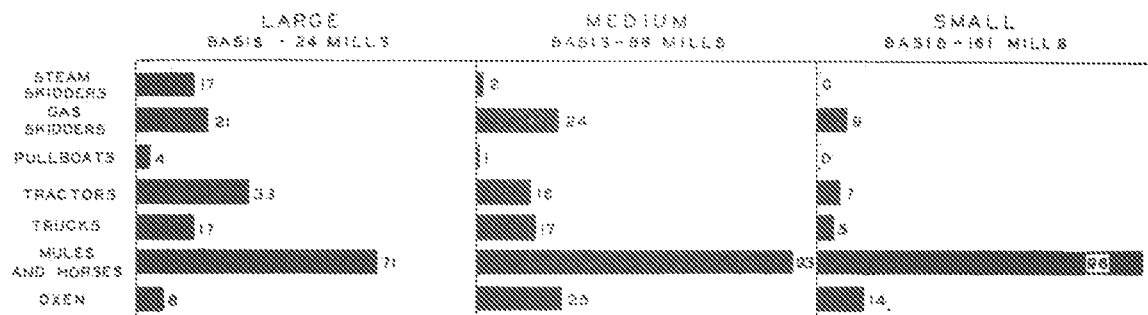
In the bunching process, a majority of the sawmills sampled were using animals, chiefly mules, either skidding the logs or hauling them with high wheels or wagons. Some of these mills used animals in combination with tractors, or with skidders propelled by gasoline or steam engines. Although horses were found on a few operations, oxen were being employed on about one out of every eight.

Figure 8 shows graphically for each subregion the percentage of the mills in each size class using specific types of equipment for bunching, singly or in combination. Each bar should be considered individually, for it represents the percentage of all mills of the size class in the subregion using a given type, even though other methods are used also.

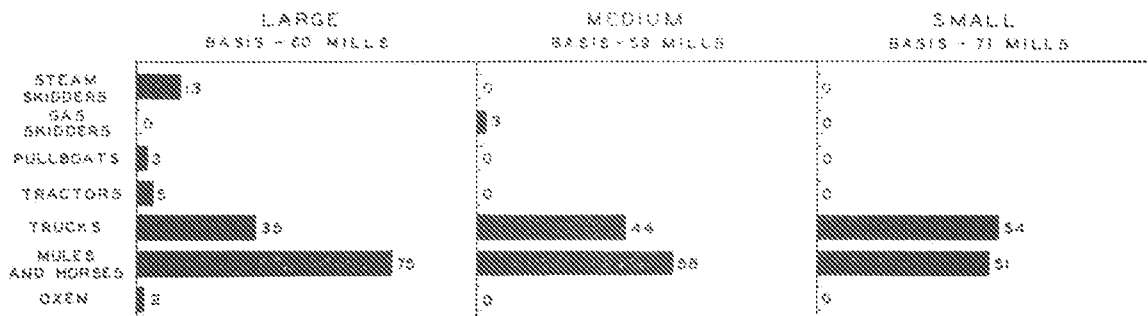
In the transportation of logs from the bunching area in the woods to the log pond or mill deck, about 90 percent of the small and medium mills and 60 percent of the large mills used trucks, logging and common carrier railroads and water transport being the means used in other instances. Logging railroads, although still used by a number of mills, chiefly large installations, are gradually being abandoned in favor of trucks. Many of the large mills use a combination of trucks and railroads. The haul by truck is as much as 40 miles in some places; that by rail may reach 150 miles. Combinations of water and truck transportation are being utilized in some sections of the South, distances up to several hundred miles being traversed by inland waterways.

Figure 9 shows graphically, by subregions, the percentage of mills in each size class using specific types of equipment for transportation to the mill, either solely or in combination with other equipment. Since 1934-35, when the samples were taken, the use of tractors, trucks, and small gas skidders has increased and the employment of animals, heavy steam skidders, and logging railroads has declined. The increase in mileage of improved roads throughout the South has made, and is still making, the use of trucks in the haul to the mill more general. At the same time the volume of logs hauled by common carrier railroads has increased somewhat as the use of private logging railroads has declined.

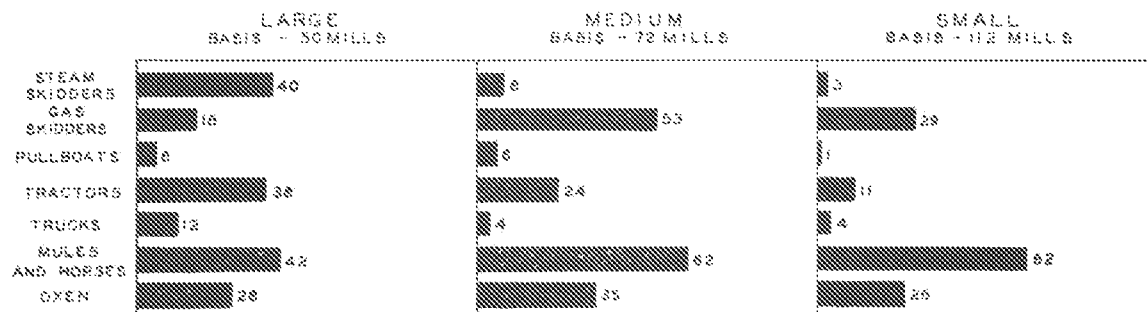
PINE-HARDWOOD SUBREGION - EAST
PERCENT OF MILLS USING INDICATED KINDS



PINE-HARDWOOD SUBREGION - WEST
PERCENT OF MILLS USING INDICATED KINDS



LONGLEAF-SLASH PINE SUBREGION
PERCENT OF MILLS USING INDICATED KINDS



DELTA HARDWOOD SUBREGION

PERCENT OF MILLS USING INDICATED KINDS

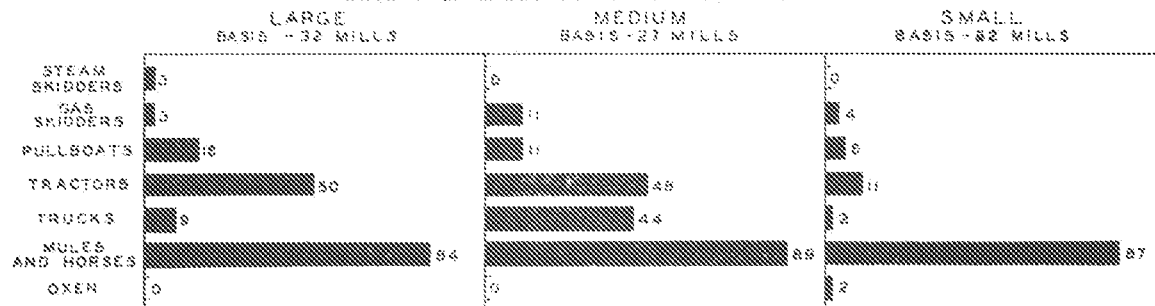
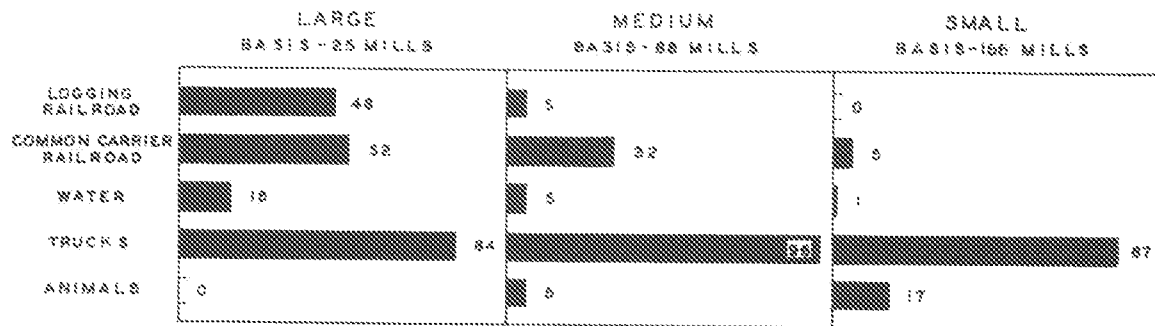
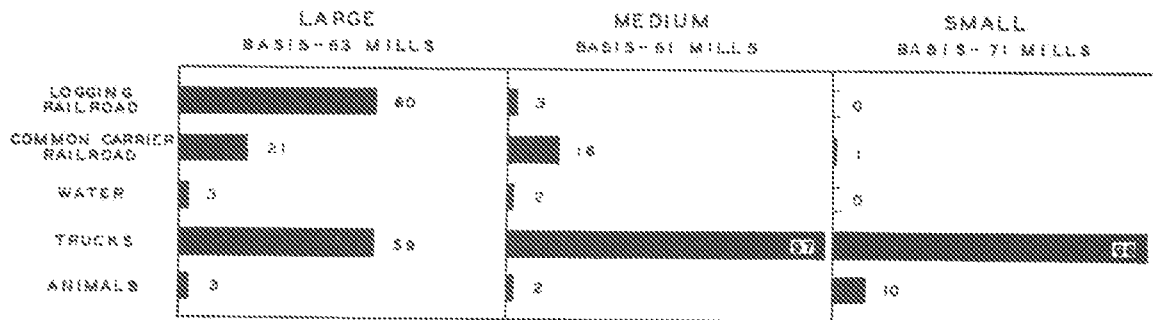


FIGURE 8.- PATTERN OF MOTIVE POWER USED IN BUNCHING LOGS.
(BASED ON SURVEY OF 1934-35)

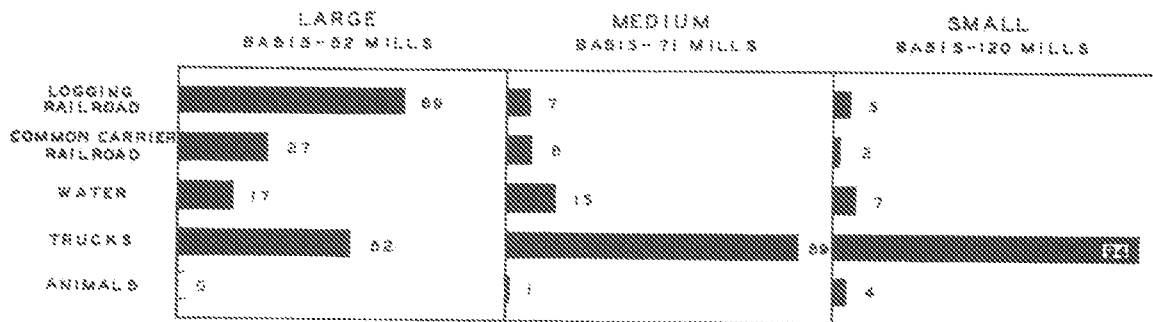
PINE-HARDWOOD SUBREGION - EAST
PERCENT OF MILLS USING INDICATED METHODS



PINE-HARDWOOD SUBREGION - WEST
PERCENT OF MILLS USING INDICATED METHODS



LONGLEAF-SLASH PINE SUBREGION
PERCENT OF MILLS USING INDICATED METHODS



DELTA HARDWOOD SUBREGION
PERCENT OF MILLS USING INDICATED METHODS

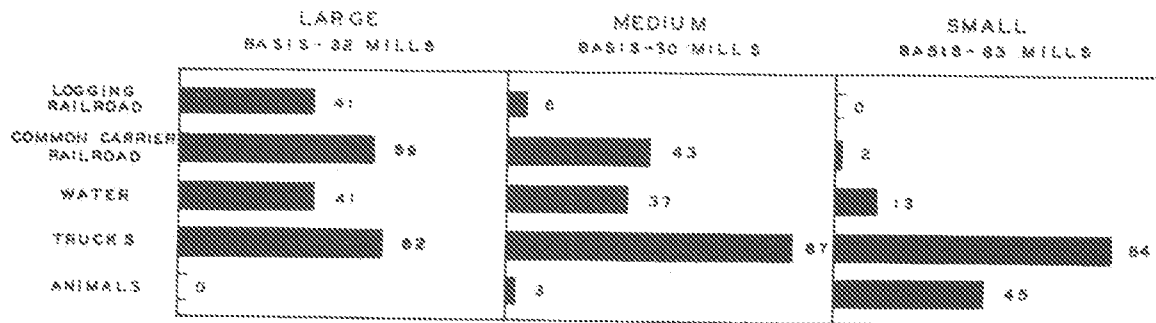


FIGURE 2.-PATTERN OF PRINCIPAL METHODS OF TRANSPORTING LOGS FROM WOODS TO MILL 1934-35.

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The Nonlumber Industries

Other important wood-using industries in the lower South produce cross ties, pulpwood, veneer, cooperage, poles, etc., and together account for 20 percent of the utilization drain. Domestic and farm uses of timber such as for fuel wood and fence posts, along with cutting for such purposes as land clearing, are chargeable for more than 26 percent of the utilization drain, but these items are not considered as industries in the commercial sense of the word and are not discussed here.

Only the eight leading primary nonlumber industries, which get their raw material in the form of logs, bolts, or stumps, are considered in this report (table 2, fig. 10). Secondary industries such as furniture and casket factories, assembly mills for boxes, barrels, and other containers, paper mills using purchased pulp, etc., are not included, nor are industries dealing in forest products other than wood, such as gum turpentine and rosin, spanish moss, cedar oils, etc.

Pulp

From the standpoint of capital invested and value of product, the wood pulp industry leads in the nonlumber wood-using group. This industry has expanded in recent years; since 1935, 11 new mills have been built and are in production, 4 mills are now (1940) under construction, and several of the 25 mills in the region have increased their capacity in the last 3 years. By far the larger portion of the pulp is made by the sulphate process, although mechanical and sulphite processes are used in a few of the plants. The major products are kraft pulp and paper, container board, bleached papers, and wall board. Newsprint and rayon pulps are also made, at 1 mill each. In the present year (1940) Louisiana, with 7 mills, still leads in number of plants. Insofar as the drain of pulpwood is concerned, the data (fig. 2) indicate that Mississippi, Louisiana, and Alabama were in the forefront in 1937, but this situation is not static and the relative standing of states in pulpwood drain is likely to show pronounced changes when all mills are in full production.

Treating

The wood-preserving industry is expanding; during the period 1936 to 1939 inclusive, 12 new plants were established, while only 2 were abandoned. Most of the 63 plants operating in 1939 employed pressure processes, using chiefly creosote in the treatment of cross ties, poles, piles, lumber, and other wood products. The plants are rather well distributed through the region, Louisiana leading with 12 plants in 1939.

Extracting

The extraction of gums, resins, acids, and oils from wood is an industry that plays an important role in salvaging low-grade wood of little or no value for other purposes. An active demand exists for these commodities. Arkansas has the only destructive hardwood plant in the South, producing wood

alcohol, acetic acid, charcoal, and derived products. In northern Alabama a tannic acid plant has been operating for years, using oak and chestnut. The major wood-extractive industry of this region, however, engages in the production of turpentine, rosin, rosin oils, tar, charcoal, and derived products in the longleaf-slash pine area. This industry does not use live trees, but seasoned stumps and topwood of longleaf pine trees cut in decades past when the lumber industry exploited the vast stands of virgin pine timber. About half of the 26 plants in operation in 1939 used the steam-solvent process; these are chemical plants of a highly specialized nature requiring large capital investment. The other half of the wood naval stores industry uses the destructive distillation process and the plants are of smaller size. The industry has expanded in recent years, 5 new plants having been established between 1935 and 1939, all using the steam-solvent process.

Veneers

Rotary-cut veneer production is a relatively stable industry in the South, 124 plants being in operation in 1937. The veneers produced are chiefly for the package industry, but increasingly large quantities of furniture and plywood face veneers are made. The face veneers are cut chiefly in the hardwood bottomlands of the Mississippi River and in other extensive river bottoms where suitable hardwood species are available. Package veneers are made of pine and hardwood and the plants are scattered all over the region, but usually are situated near a point of utilization. Florida, which ships large quantities of fruit and vegetables, ranks first in volume of wood utilized for veneers, chiefly for packages (fig. 2). The veneer industry continues to expand slowly in the South and the number of plants has increased since 1935, a few of them having changed location in the same period.

Cooperage stock

Plants manufacturing barrel staves, heading, and hoops are quite numerous and well distributed; there were 228 installations in 1937. Arkansas leads in both number of plants and volume of timber used. Most of the plants in the Southeast manufacture slack cooperage stock, chiefly from the soft-textured hardwoods; this stock is used mainly for fruit and vegetable containers. Centering in South Georgia is a group of 44 plants that make staves and heading for rosin barrels.

The production of tight staves is centered in Arkansas and the northern sections of the region, where important quantities of rived white oak stave billets for export are produced also. These tight-stave plants are migratory in character, being set up for local supplies of white oak as they become available.

The plants shown in figure 10 are chiefly producers of rough staves and heading, and generally do not finish the staves or assemble the barrels. A few make wooden hoops. There seems to be no marked general tendency towards expansion; the number of plants has remained fairly constant in recent years. In the naval stores section of the region, there is a decline owing to the trend toward the use of steel drums and paper bags for the shipment of rosins.

Table 2.--Number of nonlumber, primary wood-using plants in the lower South, 1937

Survey unit	Treating	Veneer	Cooper- age stock	Pulp	Handl- ing and di- version stock	Pine wood distillation		Miscel- laneous	All plants
						Destruc- tive	Steam- solvent		
Alabama #1	2	5	5	3	2	-	3	11	31
" #2	-	5	6	-	6	-	-	2	20
" #3	1	11	1	-	4	-	-	17	34
" #4	1	5	3	1	1	-	-	1	13
" #5	2	3	18	-	2	-	-	29	54
" #6	-	2	8	-	2	-	-	7	20
Total Alabama	6	32	41	4	17	-	3	68	171
Arkansas #1	2	7	20	-	25	-	-	4	58
" #2	-	5	9	-	8	-	-	15	37
" #3	2	5	13	2	19	-	-	27	68
" #4	-	4	10	-	7	-	-	10	31
Total Arkansas	4	19	52	2	59	-	-	56	128
Florida #1	3	18	11	2	1	2	-	25	62
" #2	1	5	6	2	1	7	1	52	75
" #3	1	21	-	-	-	-	-	11	33
" #4	1	-	-	-	-	-	-	2	3
Total Florida	6	44	17	4	2	9	1	90	173
Georgia #1	2	8	19	2	1	2	1	4	39
" #2	-	4	10	-	2	-	-	12	28
" #3	2	12	-	-	7	-	-	14	35
" #4	2	-	4	-	3	-	-	14	23
" #5	-	1	3	-	-	-	-	6	10
Total Georgia	6	25	36	2	13	2	1	50	135
Louisiana #1	-	2	17	1	2	-	-	1	23
" #2	2	5	6	-	1	2	-	3	21
" #3	3	1	3	1	2	-	1	4	13
" #4	2	5	-	1	1	-	1	1	11
" #5	5	2	5	4	1	-	-	1	18
Total Louisiana	12	15	33	7	7	2	2	10	68
Mississippi #1	-	1	5	1	2	-	-	1	10
" #2	2	1	10	-	19	-	-	3	35
" #3	5	10	17	-	6	-	-	6	44
" #4	4	11	4	2	3	-	5	4	34
Total Mississippi	11	23	36	3	30	-	5	14	123
Oklahoma #1	1	-	3	-	-	-	-	3	12
Texas #1	7	9	4	2	5	-	-	13	40
" #2	3	17	1	-	1	-	-	50	72
Total Texas	10	26	5	2	6	-	-	63	112
Grand total	66	184	238	24	134	13	13	364	1,006

1/ Includes Delta portion of Missouri, Kentucky, and Tennessee.

Table 3.—Employment provided by primary forest industries in the lower South, 1937

Site of work and industry or commodity	Total	Alabama	^{1/} ^{2/} Arkansas	Florida	Georgia	Louisiana	Mississippi	^{2/} Oklahoma	Texas ^{2/}
— — — — — Thousands of man-hours — — — — —									
<u>In the woods:</u>									
Lumber	110,070	21,200	14,500	12,040	10,820	17,510	19,760	1,640	12,600
Cross ties (hewn)	30,290	2,490	5,520	4,540	3,160	5,020	5,080	560	3,920
Poles and piles	4,940	1,130	450	320	430	210	1,150	10	580
Veneer	9,990	1,010	1,490	2,470	1,500	910	2,040	negl.	570
Cooperage	7,060	990	2,000	470	600	1,410	1,280	170	140
Pulpwood	21,120	4,120	3,730	1,260	2,110	4,130	4,090	—	1,080
Extractives	8,870	1,100	^{3/}	3,200	880	820	2,870	—	—
Miscellaneous industries	8,300	2,260	3,280	160	640	210	1,240	400	110
Total	200,700	34,360	30,970	25,120	20,140	30,820	37,510	2,780	19,000
<u>In the plants:</u>									
Lumber	184,570	34,670	22,060	19,310	19,300	29,990	33,910	3,210	22,120
Treating	8,930	750	1,010	870	690	1,440	1,300	—	2,420
Veneer	20,980	2,250	1,430	4,030	2,560	2,230	5,560	—	2,920
Cooperage	9,640	1,170	3,120	550	820	1,750	1,950	130	150
Pulpwood	35,640	4,510	1,880	3,490	2,380	17,090	4,190	—	2,100
Extractives	2,010	450	^{3/}	2,140	1,980	870	2,570	—	—
Miscellaneous industries	3,960	470	1,720	140	600	260	640	negl.	130
Total	271,780	44,270	31,220	30,530	28,330	53,630	50,620	3,340	29,840
Grand total	472,480	78,630	62,190	55,650	48,470	84,450	88,130	6,120	48,840

^{1/} Includes Delta portions of Missouri, Kentucky, and Tennessee; refer to map, figure 3.^{2/} Part of State only; refer to figure 3.^{3/} Grouped under miscellaneous to avoid disclosure of data on one plant.

Handles, excelsior, etc.

There are several specialty industries in the area, utilizing particular species of trees or making special products. Examples are the manufacture of excelsior from pine and yellowpoplar; handles, utilizing pine, hickory, and ash; and small-dimension plants producing blanks and squares for golf heads, bat blanks, ski stock, dowel pins, paper plugs, etc. Most of these plants are more or less permanent in character, since the demand for the products creates no exhaustive drain on the species used. Another industry, using dogwood and persimmon in the manufacture of blocks for shuttles and bobbins, is migratory in character because of its dependence on local supplies of bolts.

Labor Requirements

More than 472 million man-hours of gainful employment were provided in 1937 by the forest industries mentioned in this release, as shown in table 3. While it is difficult to state the exact number of persons given employment, an estimate can be made on the basis of an average of 8 hours per day per person for 100 working days per year. On this assumption these industries provided more than half a million persons with work, from which they earned all or a part of their livelihood. While employees in the mill or factory generally depend entirely upon their wages for cash income, woods workers, except in large operations, supplement their wages with part-time farm work or other employment. In addition to the figures shown in table 3 is the employment provided by transportation facilities such as common carriers, waterways, etc.

Table 4 shows the average number of man-hours of labor required to produce a thousand feet, board measure, of logs in the woods and a thousand board feet of lumber in the mill. The data are further subdivided according to the species cut and the three size classes of mills.

Table 4.—Average labor in the woods and in the mill required to produce 1,000 board feet of lumber, 1937

Species cut	Logging			Milling			Combined logging and milling		
	Size of mill			Size of mill			Size of mill		
	Small	Medium	Large	Small	Medium	Large	Small	Medium	Large
— — — — — — — — — — Man-hours — — — — —									
Pine	10.6	11.3	12.2	19.7	19.4	21.5	30.3	30.7	33.7
Hardwood	11.8	14.7	13.6	19.0	19.0	20.6	30.8	33.7	34.2
Cypress	16.8	17.5	17.6	19.9	21.0	23.3	36.7	33.5	40.9
Weighted average,									
all species	10.3	12.5	12.9	19.6	19.3	21.3	30.4	31.8	34.2

Mill operations for producing pine lumber, which usually include planing, require more labor per thousand board feet than does milling of hardwood, because much of the hardwood lumber is shipped rough to other plants, where manufacturing processes are continued. However, logging in hardwoods is commonly more difficult than in pine stands; so the combined logging and milling labor requirements for hardwood are greater than those for pine. Cypress production requires more labor than either pine or hardwood because of the greater difficulty in logging and the higher degree of finishing of the lumber.

Labor required per unit volume produced in each species group tends to increase in both logging and milling as the mill increases in size (table 4). But in the case of mills of over 80 M board feet capacity, the labor requirements in logging are relatively low, and in milling the figure is slightly less than that for the next smaller class (fig. 11). These differences in labor requirements, as is well known, are due to variations in (1) type of logging, (2) proximity to the timber, (3) kind of product manufactured, (4) amount of machinery used, and (5) general efficiency.

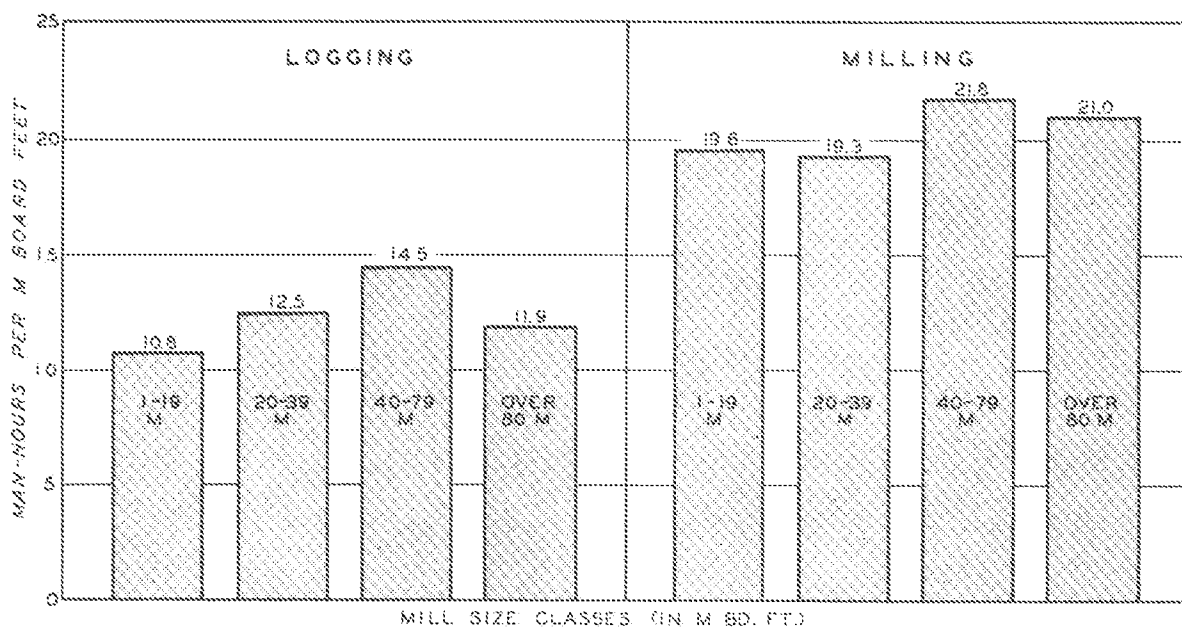


FIGURE 11.— AVERAGE LABOR REQUIREMENTS FOR LOGGING AND MILLING IN SAWMILLS OF VARIOUS SIZE CLASSES 1937.

PREPARED BY FOREST SURVEY, SOUTHERN FOREST EXPERIMENT STATION—RELEASE NO. 51

Studies made by the Forest Survey show that the pulp and paper industry provides more man-hours of work per unit volume of wood removed than any other forest industry in the South. While the lumber industry provides the greatest amount of employment in total man-hours (table 3), the ratio of amount of wood used to number of man-hours of labor provided places this industry fourth in the list, as is shown in figure 12.

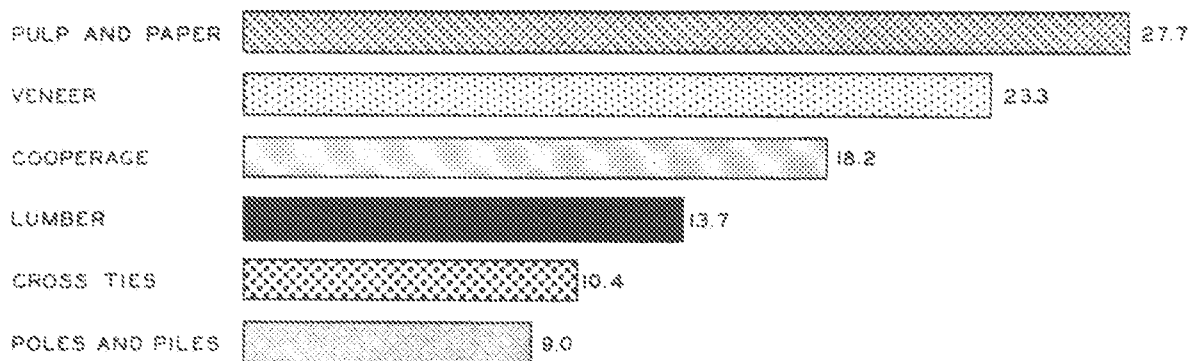


FIGURE 12—NUMBER OF MAN-HOURS OF GAINFUL EMPLOYMENT PROVIDED FOR EACH UNIT OF VOLUME (CORD) CUT AND PROCESSED BY MAJOR INDUSTRIES IN THE SOUTH.

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Forest utilization in the lower South supports an industry that ranks high in the industrial economy of the region. The supply of timber, as estimated by the Forest Survey, is sufficient to maintain this industry for many more years on a production scale as large as that indicated in this report. However, changes that are taking place in the composition of the forest stands are working to diversify and alter the character of the industry. Large saw-mills dependent upon great blocks of virgin pine and hardwood, operating logging railroads and heavy steam skidders, are rapidly giving way to smaller mills, often portable and transient, with a marked trend to light gasoline skidders, tractors, and similar equipment adapted to sparse and scattered stands, which receive their logs by truck from isolated stands over a wide countryside. Concentration yards for the storing, seasoning, grading, finishing, and marketing of the rough lumber produced by these small mills are increasingly prevalent.

A considerable degree of competition for timber that would some day make sawlog material has been caused by the great expansion in the pulp and paper industry, by virtue of the market it creates for the small, low-quality trees. This competition is being further increased because of the outright purchase by these companies of forest land, upon which cutting may be restricted and the supply of standing timber withdrawn from the open market.

Considering all the factors in the situation together, the primary wood-products industrial set-up of the South is going through a period of change. It will be worth while to survey the results of this transformation periodically, at intervals of about 10 years, recording the outcome of the contest between the old-line lumber manufacturing industry and the new, dynamic, and fast-growing conversion of the forest resources of the South into commodities by chemical and other diversified means.

